METHOD AND SYSTEM FOR PROVIDING
ACCURATE SERVICE RECORD
USING PHONE LINE DETECTOR

BACKGROUND OF THE INVENTION

1.   Field of the Invention

The present invention relates to communications systems and, more

particularly, a method and system for providing an accurate service record to a

5 communication device using a phone line detector.

2.   Discussion of the Related Art

Bluetooth technology is a well-known technology developed to standardize

data communication between disparate communication devices. This technology

10   allows communication devices having Bluetooth devices therein to communicate

with each other without the use of cables or connectors. The communication

devices can be laptops, desktops, handhelds, PDAs (personal digital assistants),

mobile phones, two-way pagers, etc. The Bluetooth communication that occurs

between the communication devices is short-range wireless communication and

15   does not require the use of a wireless cellular network. A typical Bluetooth device

includes both hardware (e.g., antenna, transmitter, receiver, etc.) and software for

implementing the short-range wireless communication. Each Bluetooth device is

configured according to predetermined Bluetooth standards and protocols so that

short-range wireless communication between two selected communication devices

and/or multiple selected communication devices is possible. Further information

regarding the Bluetooth standards, protocols and technology is available at the

5   website of http://www.Bluetooth.com.

One of the unique features that is offered by Bluetooth technology is that a

particular communication device that does not have a modem or does not want to

use its own modem (if it has the modem), is able to "borrow" the use of a modem in

another communication device through the Bluetooth devices in these

10   communication devices. This borrowing is facilitated by the operation of a Service

Discovery Protocol installed on the Bluetooth devices of these communication

devices. The Service Discovery Protocol is a required part of the software installed

in a conventional Bluetooth device.

The conventional Bluetooth device is also installed with different application

15   programs, one of which utilizes the Service Discovery Protocol to configure the

communication device to keep a list of all services which that communication device

can offer to other communication devices that may need to utilize such services.

This list of services is known as a "service record". The services identified in the

service record can include modem-based services (i.e., services that utilize a

20   modem), such as a Dial-up Networking Gateway service, a fax service, etc., and

non-modem based services such as a LAN (Local Area Network) access service, a

synchronization service, a file transfer service, etc. A detailed discussion of each of

these services is provided at the website of

http://www.palowireless.com/infotooth/tutorial/profiles.asp.   If a particular

communication device does not include a modem and is in need of a modem-based

service, or if the particular device includes a modem but the use of its own modem

5   may not be allowed or desired (e.g., the use of its own modem may be costly if the

communication device is a mobile phone), then the Service Discovery Protocol

installed in that communication device initiates communication with other

communication devices within the Bluetooth range, and requests the service record

from these other communication devices. The communication device receiving the

10   service records then may select and use, if allowed, the modem-based services

offered by these other communication devices through the use of the modem in

these other communication devices.

Figure 1 is a block diagram of a conventional communication system 50 in

which a communication device provides its service record to another communication

15   device through Bluetooth devices according to known techniques. As shown in Fig.

1, the system 50 includes a first communication device 10 including a Bluetooth

device 12 and a processor 11, operatively coupled. The first communication device

10 may or may not include a modem therein. The system 50 further includes a least

one second communication device 20 including a Bluetooth device 22, a modem 13,

20   a phone jack 14, and a phone line 15 inserted into the phone jack 14, all operatively

coupled. Each of the first and second communication devices 10 and 20 can be a

PDA, a laptop computer, a desktop computer, a mobile phone, etc., and includes

components that are typically found in these devices such as a display unit, an input

unit such as a keyboard or keypad, memory, processor, etc. Each of the Bluetooth

devices 12 and 22 includes a Service Discovery Protocol and an application

program that utilizes the Service Discovery Protocol as discussed above.

5   The Service Discovery Protocol in the Bluetooth device 22 of the second

communication device 20 stores a service record identifying a list of all services,

including modem-based services, that the second communication device 20 can

offer to other communication devices in need of modem-based services. In some

conventional systems, a communication device generates a service record after it

10   verifies that a modem exists in that communication device.

When the first communication device 10 is in need of a modem that provides

a modem-based service such as the Dial-up Networking Gateway service for

dialing-out to the Internet (e.g., because the device 10 does not have its own

modem, or if it has, the use of its own modem is not allowed or desired), the Service

15   Discovery Protocol in the Bluetooth device 12 of the first communication device 10

initiates short-range wireless communication 30 with any of the communication

devices located within the appropriate range to determine if any of the neighboring

communication devices is capable of providing modem-based services. In response

to this request from the first communication device 10, the Bluetooth device 22 in

20   the nearby second communication device 20 transmits a message back to the first

communication device 10. This message contains the appropriate service record of

the second communication device 20.

The Bluetooth device 12 receives this message and sends the service record to the processor 11. The processor 11 then displays the service record on an associated display unit for viewing by the user of the first communication device 10. The user views the service record, including a list of modem-based services that are

5   offered by the second communication device 20. The user can select one of the listed modem-based services, or the first communication device 10 can be configured to select automatically a particular service according to some predetermined criteria.   If multiple communication devices respond to the first communication device 10's request for the service record and the first

10   communication device 10 receives multiple service records, then the user may select one of the received service records and further select a particular modem-based service from the selected service record.

If the user selects one of the modem-based services offered by the second communication device 20, the Bluetooth device 12 of the first communication device

15   10 communicates this selection to the Bluetooth device 22 of the second communication device 20. Then, through the Bluetooth devices 12 and 22, the first communication device 10 initiates the selected service using the modem 13 of the second communication device 20 according to known techniques (e.g., using AT commands). In this manner, a communication device in need of a modem is able to

20   connect to a network such as the Internet through a modem of another communication device via Bluetooth short-range wireless communication, and

access any of the modem-based services offered by the communication device

having the modem.

A problem exists, however, with the conventional method of providing a

service record to communication devices. A conventional Bluetooth device is

5   configured to generate a service record either automatically or only when it

determines that a modem is present in the communication device. But, even if the

modem is present, the modem may not be actually connected to a working phone

line, in which case the communication device is not at that time capable of providing

the modem-based services listed on the service record. Thus, the conventional

10   Bluetooth device often provides the service record to other communication devices

when in fact it is not capable of actually performing the services identified on the

service record. Relying on this information, the first communication device will

attempt to dial out using the modem of the second communication device. But,

since a working phone line is not actually connected to the modem in the second

15   communication device, this attempt will fail and the first communication device will

need to look for another device capable of providing the modem-based services.

Therefore, the conventional communication system can result in a waste of time and

resources.

Accordingly, there is a need for an improved communication system and

20   method for providing accurate service records to communication devices, which

overcomes the problems of the conventional communication devices and methods

for providing service records.

SUMMARY OF THE INVENTION

The present invention provides a method and system for providing an accurate service record to communication devices seeking modem-based services. Particularly, the present invention includes a phone line detector capable of detecting whether a properly working phone line connection exists in a communication device. This can be accomplished by detecting whether an available phone line is actually plugged into a phone jack connected to a modem of the communication device. If a proper phone line connection exists, then the communication device generates a service record including a list of all available modem-based services that the communication device can offer to other communication devices in need of a modem. This allows a distribution of an accurate service record to communication devices seeking modem-based services, so that valuable time and resources are not wasted by attempting to dial out when there is no proper phone line connection to the modem.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram of a conventional system for providing a service record to communication devices.

Figure 2 is a block diagram of a communication system for providing an accurate service record to communication devices according to one embodiment of the present invention.

Figure 3 is a flow chart illustrating the processing steps of a method for

providing an accurate service record to communication devices according to one

embodiment of the present invention.

5 . <u>**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**</u>

In the drawings, the same reference numerals are used to designate the

same components.

Figure 2 is a block diagram of a system 100 for providing an accurate service

record to communication devices according to one embodiment of the present

10 invention. As shown in Fig. 2, the system 100 includes a first communication device

10 capable of performing short-range wireless communication 30 with at least one

second communication device 200 located within a predetermined range of the first

communication device 10. The first communication device 10 includes a Bluetooth

device 12 and a processor 12, operatively coupled. The second communication

15 device 200 includes a Bluetooth device 22, a modem 13, a phone line 15 connected

to the modem 13 through a phone jack 14, and a phone line detector 40, all

operatively coupled.

The phone line detector 40 detects whether the phone line 15 is properly

attached to the modem 13 or whether the phone line 15 is actually present in the

20 phone jack 14. The phone line detection by the phone line detector 40 can be

accomplished in a variety of different ways. For example, one simple way to

accomplish this is to determine whether or not the phone line 15 is actually plugged

into the phone jack 14. This detection can be made using, for example, optical

sensors, switches, etc. which may be actuated or triggered when the phone line 15

is physically connected in the phone jack 14, or by using any other known detection

devices or techniques. In another example, the determination of whether a proper

5   phone line connection exists in the second communication device 200 can be made

by detecting a voltage difference between two phone wires (also known as "tip and

ring"). Generally, the voltage difference of 48 volts will be present between tip and

ring if the phone line is properly plugged into the phone jack 14 and no one is using

the phone.

10   Examples of modem-based services may include, but are not limited to, a

Dial-up Networking Gateway service, a fax service, etc. The Dial-up Networking

Gateway service allows the first communication device 100 to dial-up a network

such as the Internet through the modem 13 of the second communication device

200, so that the user can access any website on the Internet and download these

15   web pages to a display device in the first communication device 10. The fax service

allows the first communication device 10 to transmit or receive fax messages or

documents through the modem 13 and the Bluetooth device 22.

      If the phone line detector 40 detects that there is a proper phone line

connection for the second communication device 200, the Bluetooth device 22

20   generates a service record identifying, among other services, all the modem-based

services that can be offered by the second communication device 200. The service

record then can be transmitted to the first communication device 10 when the first

communication device 10 requests for any service record from nearby

communication devices capable of providing modem-based services.

Fig. 3 is a flowchart illustrating the processing steps of a method of providing

an accurate service record to communication devices according to one embodiment

of the present invention. These processing steps can be implemented in the second

communication device 200 of the system 100 shown in Fig. 2, and can be repeated

continuously or on a regular basis to provide always an accurate service record. As

shown in Fig. 3, the Service Discovery Protocol in the Bluetooth device 22 of the

second communication device 200 determines whether a modem 13 is present in

the second communication device 200 in Step S2. If the determination results

indicate that the modem 13 is present, the Service Discovery Protocol in the

Bluetooth device 22 further determines whether there is a proper phone line

connection to the modem 13 in Step S4. This detection can be made based on the

detection results of the phone line detector 40. Step S4 can be implemented by

detecting the presence of a phone line in the phone line jack 14 and/or detecting

whether the phone line in the phone jack 14 is available for use. If the determination

results at Step S4 indicate that the proper phone line connection exists, the Service

Discovery Protocol of the second communication device 200 generates in Step S6 a

service record identifying, among other services, all available modem-based

services which can be offered by the second communication device 200 to other

communication devices in need of such services.

On the other hand, if the determination results at Step S2 indicate that the

modem is not present in the second communication device 200 or if the

determination results at Step S4 indicate that a proper phone line connection does

not exist in the second communication device 200, and if the service record has

5   been generated previously, then the second communication device 200 is

configured to remove a portion of the existing service record that identifies the

modem-based services at Step S8 (i.e., the list of modem-based services is

removed from the service record), so that an accurate service record can be

transmitted to nearby communication devices seeking modem-based services.   In

10   one embodiment, the Bluetooth device in the second communication device can be

configured to send a message to the first communication device when the phone

line detector indicates that there is no proper phone line connection for the second

communication device. This message would indicate to the first communication that

there is no proper phone line connection in the second communication device.

15   The concept of detecting a proper phone line connection and updating a

service record based on such a detection to provide an accurate service record can

be applied in other services offered by the communication device that may not be

modem-based services. Such variations are contemplated as part of the present

invention. For example, many conventional communication devices offer a LAN

20   access service to other nearby communication devices, so that the nearby

communication devices can access a LAN, if desired, by using the service offering

communication device as a LAN access point. This is accomplished through the

use of Bluetooth devices in the communication devices and a LAN access device

such as a LAN access card that is well known in the art. The LAN access service is

typically identified in the service record if it is available. In such systems, a

connection detector (functioning like the phone line detector 40) may be provided

5   near a HUB/switch (which controls the LAN access communication) so that it can

detect whether a proper cable or other line connection exists to the HUB. This can

be accomplished, for example, by detecting whether the cable is physically

connected to the HUB or by detecting the presence of a carrier signal in the cable

connected to the HUB. If no proper connection exists, then the service record is

10   updated to remove a LAN access service from the list. But if a proper connection

exists, then the service record identifying the LAN access service is generated

which can be transmitted to communication devices seeking the LAN access

service. In this manner, an accurate service record can be provided to any

communication device seeking the LAN access service.

15   Although the use of the present invention in devices capable of Bluetooth

wireless communication has been described hereinabove, the present invention is

equally applicable to any other "ad-hoc" wireless network systems such as a system

using a wireless Ethernet according to IEEE standard 802.11, or "ad-hoc" wired

networks such as UPnP (Universal Plug and Play).

20   The processing steps of the present invention can be implemented by

computer programs in conjunction with known hardware devices, e.g., a

microprocessor or other processing device. Software programming code which

embodies the present invention can be stored in storage of some type. The

software programming code may be embodied on any of a variety of known media

such as a diskette, or hard drive, or CD-ROM, and may be distributed on such

media. The techniques and methods for embodying software program code on

5   physical media and/or distributing software code are known in the art.

The invention being thus described, it will be obvious that the same may be

varied in many ways. Such variations are not to be regarded as a departure from

the spirit and scope of the invention, and all such modifications as would be obvious

to one skilled in the art are intended to be included within the scope of the following

10   claims.